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LAKE LABORATORY

JUNE 24 TO AUGUST 3

1918

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THE LAKE LABORATORY

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Department of Botany, Ohio State University

*Dr. Herbert Osborn will devote his attention solely to research and research students. He will arrange for time at the Lake Laboratory and also at Columbus.

THE OHIO STATE UNIVERSITY

The Ohio State University, located at Columbus, is a part of the public educational system maintained by the State. It comprises eleven colleges and a graduate school, each under the administration of a Dean and College Faculty as follows:

Graduate School
College of Agriculture
College of Arts, Philosophy and Science
College of Commerce and Journalism
College of Dentistry
College of Education
College of Engineering
College of Homeopathic Medicine
College of Law
College of Medicine
College of Pharmacy
College of Veterinary Medicine

The University publishes a bulletin describing the work of each of these colleges. Copies may be obtained by addressing L. E. Wolfe, Secretary of the Entrance Board, Columbus, Ohio. Persons desiring information are invited to send for the bulletin of that college in which they are interested.

This bulletin is devoted exclusively to a description of the work offered at the Lake Laboratory.

GENERAL INFORMATION

AIMS AND PURPOSES

The Lake Laboratory is designed to afford the best possible opportunity to investigators, teachers and advanced students for investigation and instruction in the biology of the lake region, with particular reference to aquatic conditions, and to provide a meeting ground for biologists. Opportunities for research or thesis work are exceptionally good. Certain courses are offered, but these are not meant to duplicate exactly what is given at the University. They are intended to give a first hand knowledge of animals and plants in their natural surroundings. They thus form an almost indispensable supplement to the more strictly laboratory type of university and college training in biology.

DATE OF THE SESSION

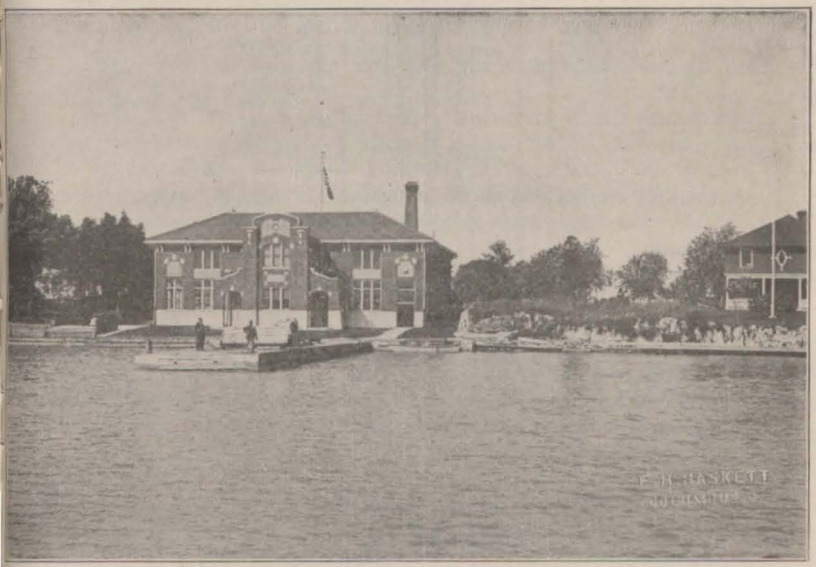
The course of instruction will open Monday, June 24th, and will close Saturday, August 3rd. The Laboratory will be open for a longer period to investigators who may desire to make use of its facilities. Students should arrive in time to be prepared to attend classes on the opening day.

LOCATION

For the session of 1918 the Lake Laboratory will be located at Put-in-Bay which is a beautiful harbor on South Bass Island in Lake Erie. This island lies about five miles off the south shore of Lake Erie and twenty miles north of Sandusky, Ohio. It is only a few hours by lake steamer from Cleveland, Toledo and Detroit. South Bass Island is one of the group of three Bass Islands, the others being Middle Bass and North Bass. Near by are Green Island and Rattlesnake Island. Scattered about in the immediate vicinity are several other smaller islands. The map on the inside page of the back cover shows the relations well. This situation offers an excellent location for a Great Lakes Biological Station. Lake Erie is probably the richest in flora and fauna of any of the Great Lakes. The islands offer a varied environment of rocky shore, sandy beach and woodland. On the mainland, within easy reach, are extensive sand dunes, large marshes, woodlands and streams.

FACILITIES

The Laboratory will have excellent quarters, in the Fish Hatchery Building, owned by the State of Ohio. The second floor of this building furnishes ample room for lecture and table space. On the ground floor there are large aquaria and several tiers of hatching jars supplied with running water. Microscopes, glassware, aquatic collecting apparatus and other general laboratory equipment are supplied from the University.



FISH HATCHERY, FRONT VIEW

The Laboratory owns a small gasoline launch and rowboats. In addition to this the boats and field equipment of the Fish Hatchery will be available. There is a large boat which will enable workers to visit any part of Lake Erie.

The library of the Laboratory is supplied with the standard books of reference. There are also a large number of reprints from the United States Bureau of Fisheries, the publications of biological surveys from various states and the papers of individual workers.

FEES

The total Laboratory fee is fixed at $20 for a term of six weeks' instruction. No enrollment will be made for less than half a term. Each course is expected to occupy half of the time available, therefore each student, on payment of one fee, will be entitled to any two of the courses offered. The courses are so arranged that almost any two of them may be taken without conflict of hours. No charge is made to independent investigators.

METHODS OF WORK

As a rule the work in any given course occupies the entire teaching day. The courses are so arranged as to days of the week that there is usually little danger of conflict. The work will consist of field observations, the study of the relation of organisms to their environment, and work in the laboratory. The courses in ecology are well adapted to fit teachers in secondary schools for presenting this phase of biology to their students. The opportunity for making teaching collections is exceptionally good.

UNIVERSITY CREDIT

Students with university standing may secure three semester hours' credit in the University for each course. In special cases the time may be doubled, in which case six semester hours' credit is given. Research students may make arrangements to continue the work for two additional weeks with credit. Credits may be transferred under the usual regulations to other institutions.

FREE TABLES FOR INVESTIGATORS

Properly qualified persons who may desire to engage in the independent investigation of biological problems will be cordially welcomed. No fees will be charged, and table room, boats, aquaria, etc., will be supplied, subject only to such provisions as may be necessary to make the facilities equally available to all. Each investigator will be expected to furnish his own microscope, personal equipment and special apparatus or reagents needed in his investigation unless otherwise arranged for.

It is presumed that all persons taking advantage of this provision are fully prepared to do independent work and, while suggestions and conferences may be freely granted, no claim upon the time of instructors is assumed.

The Laboratory will be open for investigators and independent workers from June 24th to August 16th. Applications for table room

should be made as early as practicable. With the application there should be sent a statement of the time during which accommodations will be desired and some indication of the facilities that will be required.

EXCURSIONS

From the nature of the locality a great number of delightful excursions are possible, and many rich collecting grounds may be visited. Special trips are made on Saturdays. Black Channel, Lakeside, Blue Hole at Castalia, Kelley's Island, Hen and Chicken Islands, Johnson's Island, Sandy Beach and Bay Point, East Harbor, West Harbor, the sand dunes of Cedar Point, Green Island, the Upper Sandusky Bay and River, the gypsum beds near Gypsum and the Life Saving Station at Marblehead are among the points of special interest.

GENERAL LECTURES

Lectures of general interest are given by members of the station staff, and other lecturers are secured from outside when possible. These lectures are given weekly or oftener. Each member of the instructional staff gives at least one lecture.

LIVING AND EXPENSES

Students and other workers at the Laboratory will find comfortable accommodations for room and board in a number of cottages along the water front in the immediate vicinity of the Fish Hatchery Building. In the past it has been possible to obtain board and room for as low as $7.00 per week. The average cost may be a little higher. The total cost for board and room for the entire session of six weeks should not exceed $50.00. An effort is being made to engage a cottage for the sole use of those in attendance at the Laboratory. It is possible that the cost of living will be somewhat lowered by this arrangement. The success of the plan will depend largely on the numbers in attendance. For those who care to bring tents, space can be furnished.

It is suggested that those who expect to attend the session notify the Acting Director as soon as practicable. He will be glad to give all information possible and will lend his aid in making suitable living arrangements.

In addition to living expenses, it will be well to provide about $10.00 for other necessaries. Beyond these expenses and the registration fee the cost of attending the Laboratory will depend largely upon individual tastes and wishes.

RECREATION

In addition to the field work, collecting excursions and outdoor activities connected with the regular work, the opportunities for rowing, sailing, and bathing provide abundant means for physical exercise. The best of health has been the rule with those in attendance during past years.

PERSONAL EQUIPMENT SUGGESTIONS

For the benefit of persons who have not previously attended the Laboratory the following list of articles is given as a guide in making preparations.

Strong, comfortable shoes and clothing suitable for tramping or general field work (rubber boots are a convenience); sweater and other provisions for cold weather; rain coat; bathing suit; field, laboratory and lecture notebooks and drawing supplies, although these can be obtained at the Laboratory; hand lens; simple dissecting set; strong pocket knife; kodak; any textbooks, general or specialized, dealing with the subjects to be studied will be useful.

APPLICATION AND CORRESPONDENCE

It will be to the best interests of all concerned for prospective students and investigators to enter into correspondence as soon as possible. Advice with regard to the possibilities for research, the lines of work students should pursue or any information concerning the Laboratory will be gladly given. It is not wise to come to the Laboratory without previous correspondence with those in charge. For those who fail to do this there can be no guarantee of proper accommodations.

Correspondence should be addressed to the Director, Professor Herbert Osborn, or to the Acting Director, Dr. F. H. Krecker, Ohio State University, Columbus, Ohio.

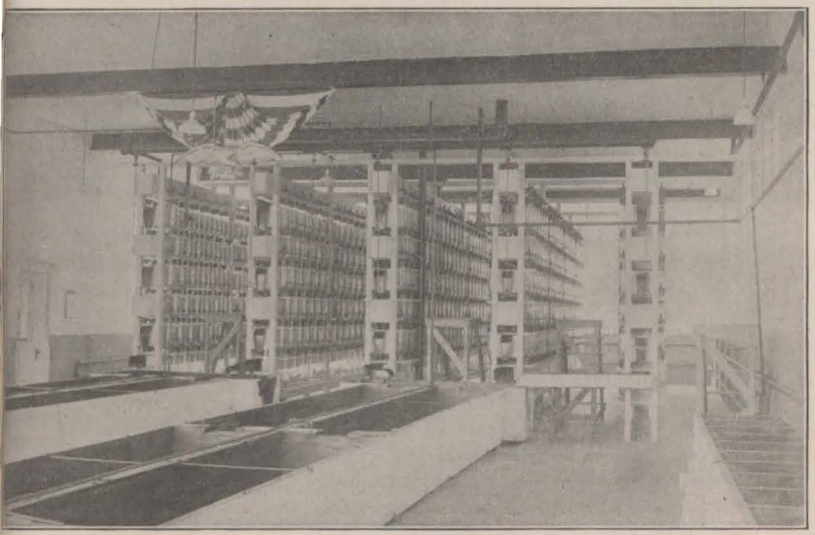
After June 17th, address all correspondence to Dr. F. H. Krecker, Acting Director, Lake Laboratory, Put-in-Bay, Ohio.

COMMUNICATION AND TRANSPORTATION

The steamer service available from Sandusky, Cleveland, Toledo and Detroit affords exceptionally good facilities for reaching the Laboratory with a minimum expense.

Railroads of the Central Passenger Association sell excursion tickets during the summer, from many points within a radius of 200 miles of Sandusky, which afford very cheap rates. For information as to such rates, consult local railroad agents.

The most frequent communication with the mainland is by way of Sandusky, and therefore, in most instances, it will be best to go to Sandusky by rail and change there to steamers for Put-in-Bay. A steamer leaves Sandusky twice daily, once in the morning and once in the afternoon. Upon arriving in Sandusky go to the Put-in-Bay dock at the foot of Columbus Avenue. This is a short walk from the Pennsylvania and the Big Four railroad stations. From the Baltimore and Ohio, the Lake Shore, and the Lake Erie and Western station it can be reached by street car. Information regarding exact steamer schedules may be obtained from J. A. Millott, who has a transfer office on the dock. Upon reaching Put-in-Bay ask for the State Fish Hatchery Building. This is a five-minute walk to the right along the bay shore.



INSIDE VIEW OF FISH HATCHERY

BAGGAGE, FREIGHT AND MAIL

Mail, express and freight should be addressed in care of THE LAKE LABORATORY, PUT-IN-BAY, OHIO.

A transfer agency on the Put-in-Bay dock in Sandusky will give prompt attention to bringing trunks from the railroad stations to the steamer. At Put-in-Bay transfer agents meet incoming steamers.

DEPARTMENTS OF INSTRUCTION

ZOOLOGY AND ENTOMOLOGY

107-108. ENTOMOLOGY. Three or six credit hours. Field and laboratory course, including instruction in collecting, mounting and identifying insects in connection with studies in life history and anatomy. Excellent opportunities for life history studies are offered both on aquatic and terrestrial forms.

*137-138. ADVANCED ENTOMOLOGY. Three or eight credit hours. Prerequisite, Zoology 101-102, 107-108, or equivalent.

161. ECOLOGY OF FRESHWATER ANIMALS. Three credit hours. Prerequisite, Zoology 101-102, or equivalent, and one additional year of biological work. This course deals with the relations of the aquatic animals of the region to their surroundings. The varied environments of the Lake afford good opportunities for this work. The student is also made familiar with the associations to be found in streams and ponds. The factors governing these associations and the general conditions of aquatic existence are considered. Lectures, field and laboratory work Dr. Krecker.

*163. EMBRYOLOGY. Three credit hours. A study of mitosis, segmentation, and germ layer formations of different types, but with special emphasis on the development of the fish. The course will be offered as far as possible from material collected at the Laboratory. Students properly qualified may undertake the study of some embryological problem.

*165. ICHTHYOLOGY. Three credit hours. Special course devoted particularly to lake fishes, their habits and food supplies.

*166. ORNITHOLOGY. Three to six credit hours. Prerequisite, Zoology 101-102 and an additional year of biological work. Field work, together with lectures on morphology and natural history of birds. In the field work especial attention will be devoted to the study of the shore, swamp and water birds, breeding habits, and the ecological conditions of the vicinity of the Laboratory.

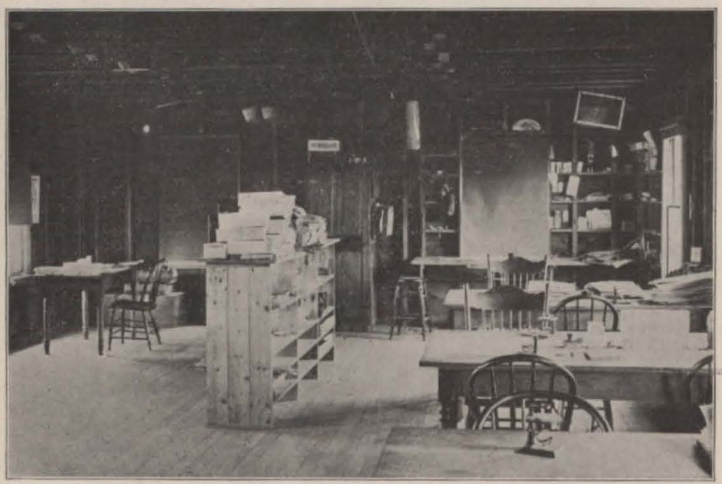
Each student should be provided with field glass or opera glass.

169. MORPHOLOGY OF INVERTEBRATES. Three or six credit hours. Prerequisite, Zoology 101-102 or equivalent, and one additional year of biological work. An advanced course dealing especially with the aquatic invertebrates of the region for students who wish to familiarize themselves with the structure and classification of these forms. The work in-

Note: The prerequisite course numbers refer to the University Catolog.
*Not offered in 1918.

cludes laboratory study of material from the region and lectures on the principles of invertebrate structure and relationships.

241-242. RESEARCH WORK. Three to eight credit hours. Prerequisite, Zoology 101-102, 121-122 or equivalent. Properly qualified graduate students who so desire may enter upon some faunal, ecological, or other problems under the direction of the instructor in charge of the subject chosen. Dr. Herbert Osborn will be at the Laboratory when possible during the session and at such times will be able to give attention to students doing research in entomology. Dr. R. C. Osburn, Head of the Department of Zoology and Entomology in the University, will make occasional visits to the Laboratory. He will at all times be glad to lend his advice and counsel to students engaged in zoological research.



BOTANICAL LABORATORY

BOTANY

161. PLANT ECOLOGY. Three or six credit hours. Prerequisite. Botany 101-102 and one additional year of some biological subject. Field and laboratory course, accompanied by lectures, quiz, and consultation of the literature. A study of the plants of the region in relation to the various factors of their environment, such as water, light, soil, temperature; the identification of trees, shrubs, and herbaceous plants and their

grouping into associations. The wide range of conditions within a short distance of the Laboratory affords excellent opportunity for this subject.

163. Structure and Identification of Aquatic Plants. Three or six credit hours. Laboratory work and lectures. The purpose of this course is to familiarize the student with the structure and taxonomy of the aquatic plants of the region with emphasis upon the algae. The Lake and adjoining coves and ponds are exceedingly rich in this type of flora. The work includes laboratory studies of material and lectures on taxonomy and morphology.

165. Special Work. Three to eight credit hours. Prerequisite, Botany 101-102 and one additional year of some biological subject. Properly qualified students may select some subject in Ecology, Morphology, Systematic Botany, Algology or some other problem and carry on work under the supervision of the instructor in charge of the subject chosen.

PUBLICATIONS AND RECORDS

A considerable number of publications based wholly or in part on investigations at the Laboratory have been issued and a number of others are in preparation. These are expected in time to cover as fully as possible a systematic record of the plants and animals, occurring in the vicinity of the Laboratory as well as results of morphological, embryological or ecological studies. A partial list is given below. A constantly growing card catalogue record of species occurring in the region serves to show the available material and forms a basis for faunistic and ecologic studies.

PUBLICATIONS BASED WHOLLY OR IN PART UPON WORK DONE AT THE LAKE LABORATORY

Rotifera of Sandusky Bay. D. S. Kellicott, Trans. Am. Mic. Soc.
The Odonato of Ohio. D. S. Kellicott, O. Ac. Sci., S. P. 2, 1-116, 4 pl.
The Fishes of Ohio. Raymond C. Osburn, O. Ac. Sci., S. P. 4, 1-104.
Galls and Insects Producing Them. Melville Thurston Cook, parts 1 to 9, O. Nat., II, 263; III, 419; IV, 125.
Tabanidæ of Ohio. James S. Hine, O. Ac. Sci., S. P. 5, 1-157, 2 pl.
Observation on Hymenopterous Parasites of Certain Fulgoridæ. Otto H. Swezey, O. Nat., III, 444-452.
A List of the Orthoptera of Ohio. C. S. Mead, O. Nat., IV, 109-112.
The Coccidæ of Ohio. James G. Sanders, O. Ac. Sci., S. P. 8, 65 pp., 9 pl., 86 fig.
Batrachians and Reptiles of Ohio. Max Morse, Pr. O. Ac. Sci., IV, 91-144.
An Ecological and Experimental Study of Sarcophagidæ with Relation to Lake Beach Debris. W. B. Herms, Jour. Exp. Zool., IV, 45-83.

On the Place of Origin and Method of Distribution of Taste Buds in Ameriurus Melas. F. L. Landacre, Jour. Comp. Neur. and Psychol., XVII, 1-66.

The Birds of Cedar Point, Sandusky, Ohio. R. L. Baird, O. Nat., Vol. II, p. 143.

Notes on Bird Life of Cedar Point. R. F. Griggs, O. Nat., Vol. I, p. 91.

Dragon Flies of Sandusky. James S. Hine, O. Nat., Vol. I, p. 94.

Sponges and Bryozoans of Sandusky. F. L. Landacre, O. Nat., Vol. I, p. 96.

Zoological Notes. Herbert Osborn, O. Nat., Vol. I, p. 86.

Notes on the Flora of Sandusky. W. A. Kellerman, O. Nat., Vol. I, p. 82.

Variations in the Water Snake. Max Morse, O. Nat., Vol. II, p. 183.

Algæ from Sandusky Bay. Lumina C. Riddle, O. Nat., Vol. III, p. 317.

The Flora of Little Chicken Island. John H. Schaffner, O. Nat., Vol. III, p. 33.

Life History Notes on Two Fulgoridæ. Otto H. Swezey, O. Nat., Vol. III, p. 354.

Notes on Interesting Ohio Willows. R. F. Griggs, O. Nat., Vol. IV, p. 11.

New Species of Ohio Fulgoridæ. Herbert Osborn, O. Nat., Vol. IV, p. 44.

A Further Contribution to the Hemipterous Fauna of Ohio. Herbert Osborn, O. Nat., Vol. IV, p. 99.

The Breeding Habits of the Myriopod, Fontaria Indianæ. Max Morse, O. Nat., Vol. IV, p. 161.

The Embryo Sack and Embyro of the Nelumbo. H. H. York, O. Nat., Vol. IV, p. 167.

Flora of Cedar Point. W. A. Kellerman and O. E. Jennings, O. Nat., Vol. IV, p. 186.

Flora of Hen and Chicken Islands, 1903. W. A. Kellerman, O. Nat., Vol. IV, p. 190.

Report of Progress on Study of Hemiptera of Ohio and Description of New Species. Herbert Osborn, O. Nat., Vol. V, p. 273.

Notes on the Morphology of Philotria. Lumina C. Riddle, O. Nat., Vol. V, p. 304.

The Rate of Growth in Epistylis Flavicans. F. L. Landacre, O. Nat., Vol. V, p. 325.

The Willows of Ohio. R. F. Griggs, Proc. Ohio Acad. Sci., S. P. No. 11.

The Naididæ of Cedar Point. L. B. Walton, Am. Nat., Vol. XL, p. 638.

Notes on the Fall Webb Worm (Hyphantria cunea) in Ohio. E. W. Berger, O. Nat., Vol. VI, p. 453.

Correlation and Variation in Internal and External Characters in the Common Toad (Bufo lentiginosus Americanus Le C.). W. E. Kellicott, Jour. of Exp. Zoology, Vol. IV, 575.

An Ecological Classification of the Vegetation of Cedar Point. Otto E. Jennings, O. Nat., Vol. VIII, 291.

The Protozoa of Sandusky Bay and Vicinity. F. L. Landacre, Ohio Ac. Sci., S. P., 13.

The Pinkus Nerve in Amia and Lepiodosteus. Chas. Brookover, Science N. S., Vol. XXVII, p. 473 (1908).

The Olfactory Nerve, the Nervus Terminals and the Preoptic Sympathetic System in Amia calva. Chas. Brookover, Jour. Comp. Neurology and Psychology, Vol. XX.

The Olfactory Nerve and the Nervus Terminalis of Ameiurus. Chas. Brookover and Theron S. Jackson, Jour. Comp. Neurology and Psychology, Vol. XXI, p. 237-259 (June, 1911).

The Origin of the Cranial Ganglia in Ameiurus. F. L. Landacre, Jour. Comp. Neurology and Psychology, Vol. XX, p. 309 (September, 1910).

The Birds of Cedar Point and Vicinity. Lynds Jones, Wilson Bulletin. 1910.

Occurrence of Typhlopsylla octatenus in Ohio. Herbert Osborn, O. Nat., Vol. VIII, p. 289 (March, 1908).

Note on the Habits of Senotania rubriventris Macq. Herbert Osborn, O. Nat., Vol. VIII, p. 38 (1906).

The Epibanchial Placodes of Ameiurus. F. L. Landacre, O. Nat., Vol. VIII, 251.

The Origin of the Sensory Components of the Cranial Ganglia. F. L. Landacre, The Anatomical Record, Vol. IV, p. 71 (1910).

Syrphidæ of Ohio. C. L. Metcalf, Bulletin I, Ohio Biological Survey, 1913.

A List of the Fungi of Cedar Point. Chas. K. Brain, O. Nat., Vol. XIII, December, 1912.

Additions Made to the Cedar Point Flora During the Summer of 1911. E. L. Fullmer, O. Nat., Vol. XII, February, 1912.

Additions Made to the Cedar Point Flora During the Summer of 1912. E. L. Fullmer, O. Nat., Vol. XIII, December, 1912.

A Preliminary List of the Acarina of Cedar Point. C. K. Brain, Vol. XIII, April, 1913.

A Preliminary List of the Myxomycetes of Cedar Point. E. L. Fullmer, O. Nat., Vol. XII, February, 1912.

Some Entomophilous Flowers of Cedar Point. A. C. Conger, O. Nat., Vol. XII, April, 1912.

The Stratiomyidæ of Cedar Point. B. B. Fulton, O. Nat., Vol. XI, March, 1911.

Pollination Notes from the Cedar Point Region. Wm. Bembower, O. Nat., Vol. XI, June, 1911.

Additions Made to the Flora of Cedar Point. Stickney, Schaffner and Davies, O. Nat., Vol. X, January, 1910.

Additions and Notes on the Hemiptera-Heteroptera of Ohio. Herbert Osborn and Carl J. Drake, Ohio Nat., Vol. XV, pp. 501-508.

Insect Galls of Cedar Point and Vicinity. Paul B. Sears, O. Nat., Vol. XV, No. 2, December, 1914, pp. 377-388.

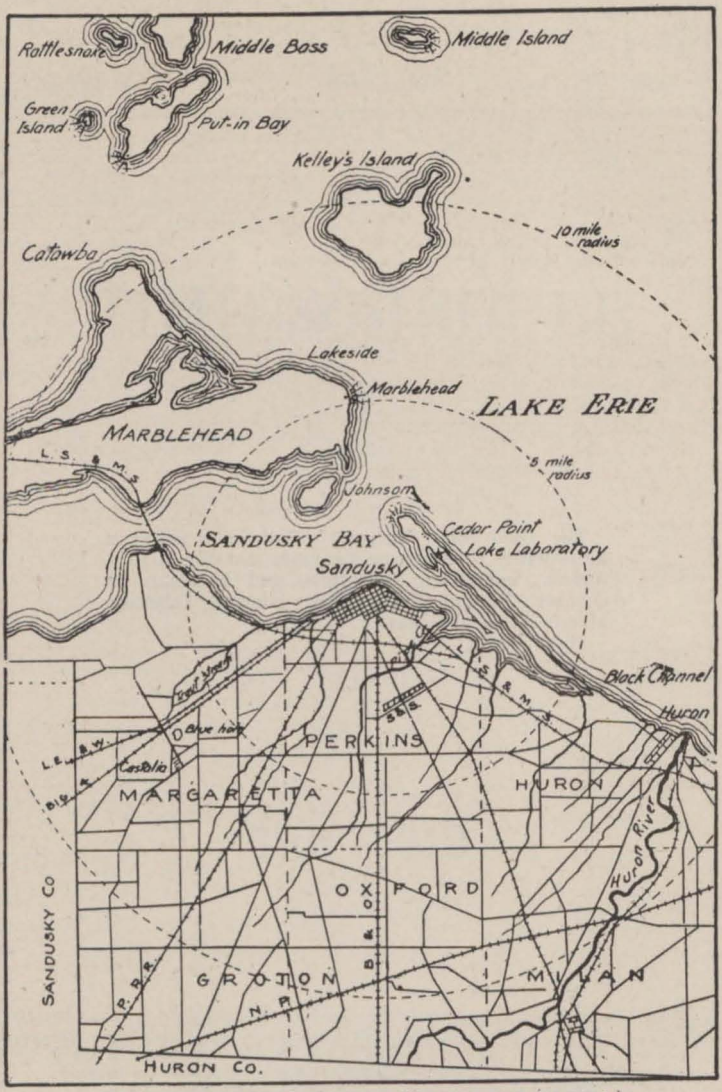
Evaporation Plant Zones in the Cedar Point Marsh. Paul B. Sears, O. Jour. Sci., Vol. XVI, No. 1, January, 1916.

Phenomena of Orientation Exhibited by Ephemeridæ. F. H. Krecker, Biological Bulletin, December, 1915.

The Reactions of the Orb-weaving Spider, Epeira sclopetaria Clerk, to Rhythmic Vibrations of Its Web. W. M. Barrows, Biological Bulletin, December, 1915.

Sun Fish Nests of Beimiller's Cove. F. H. Krecker, O. Jour. Sci., February, 1916.

A Revision of the Bembecine Wasps of America North of Mexico. J. B. Parker, Proc. U. S. Nat. Mus., Vol. 52, pp. 1-155, No. 2173.



ADAPTED FROM MOSLEY'S "SANDUSKY FLORA."

FORMER LOCATION OF LAKE LABORATORY AT CEDAR POINT,
1918 LOCATION AT PUT-IN-BAY

The Ohio State University Bulletin is issued at least twenty times during the year, monthly in July, August, September, and June, and bi-weekly in October, November, December, January, February, March, April, and May.

PRESS OHIO STATE REFORMATORY